

- 122 -

CLAIMS

We claim:

1. A T helper cell epitope selected from the group consisting of SEQ ID NOS: 6-22, 105, 123, 124, 31-35.

5 2. A T helper cell epitope according to Claim 1 for preparing a peptide immunogen represented by the formula

Sub. a!
10 (A)_n-(Target antigenic site)-(B)_o-(Th)_m-X

or

(A)_n-(Th)_m-(B)_o-(Target antigenic site)-X

or

(A)_n-(B)_o-(Th)_m-(B)_o-(Target antigenic site)-X

or

15 (Target antigenic site)-(B)_o-(Th)_m-(A)_n-X

or

(Th)_m-(B)_o-(Target antigenic site)-(A)_n-X

wherein:

20 A is an amino acid or a general immunostimulatory sequence, where n is more than one, the individual A's may be the same or different;

B is selected from the group consisting of amino acids, -HCH(X)CH₂SCH₂CO-, -NHCH(X)CH₂SCH₂CO(□-N) Lys-, -NHCH(X)CH₂S- succinimidyl(□-N) Lys-, and -NHCH(X)CH₂S-(succinimidyl)-;

25 Th is an artificial helper T cell epitope selected from the group consisting of SEQ ID NOS:6-22, 105, 31-35 or an analog thereof;

"Target antigenic site" is a B cell epitope, a peptide hapten, or a immunologically reactive analog thereof;

30 X is amino acid α -COOH or CONH₂ ;

n is from 1 to about 10;

m is from 1 to about 4; and

o is from 0 to about 10.

- 123 -

3. A peptide immunogen according to claim 2 wherein the immunostimulatory sequence is SEQ ID NO:78.

4. A peptide immunogen according to Claim 2 wherein B is selected from the group consisting of Gly-Gly, (D-N) Lys, Pro-Pro-Xaa-Pro-Pro, -NHCH(X)CH₂SCH₂CO-, -NHCH(X)CH₂SCH₂CO(D-N) Lys-, -NHCH(X)CH₂S-succinimidyl (D-N) Lys-, and -NHCH(X)CH₂S-(succinimidyl)-.

10 5. A peptide immunogen according to Claim 4 wherein B is Gly-Gly.

6. A peptide immunogen according to Claim 4 wherein B is (D-N) Lys.

15 7. A peptide immunogen according to Claim 1, 2, 3, 4, 5, or 6 wherein the the Target Antigen site is the *Plasmodium falciparum* repeating antigen:

(Asn-Ala-Asn-Pro)_p

20 (SEQ ID NO:103).

8. A peptide immunogen according to Claim 7 wherein p=4.

Sub. G2 9. A peptide immunogen according to Claim 7 selected from the group consisting of SEQ ID NOS: 104, 105.

10. A peptide immunogen according to Claim 1, 2, 3, 4, 5, or 6 wherein the the Target Antigen site is selected from the group cosisting of SEQ ID NO: 106, 107, 108, and 109, 30 an epitope of CETP.

Sub. G3 11. A peptide immunogen according to Claim 10 selected from the group sconsisting of SEQ ID NOS:110 - 119.

- 124 -

12. A peptide immunogen according to Claim 1, 2, 3, 4, 5, or 6 wherein the the Target Antigen site is selected from the group cosisting of SEQ ID NOS: 125, 131, 132, 133, 134, and 135, an epitope of HIV.

5

~~13. A peptide immunogen according to Claim 12 selected form the group consisting of SEQ ID NOS:126 - 129, 136-151.~~

Sub. 94

~~14. A peptide immunogen according to Claim 13 selected form the group consisting of SEQ ID NOS:148 - 151.~~

10

15. A method for producing a peptide immunogen by covalently linking a T helper cell epitope to a target antigenic site selected from the group consisting of B cell epitopes of an antigen and a peptide hapten.

15

16. A method for producing a peptide immunogen according to Claim 15 further linking the covalently linked T helper cell epitope and target antigenic site to an immunostimulatory sequence.

20

17. A method for producing a peptide immunogen according to Claim 16 wherein the immunostimulatory sequence is SEQ ID NO:78.

25

18. A method for producing a peptide immunogen according to Claim 17 wherein B is selected from the group consisting of Gly-Gly, (D-N)Lys, Pro-Pro-Xaa-Pro-Pro, -NHCH(X)CH₂SCH₂CO-, -NHCH(X)CH₂SCH₂CO(D-N)Lys-, -NHCH(X)CH₂S-succinimidyl(D-N)Lys-, and -NHCH(X)CH₂S-(succinimidyl)-.

30

19. A method for producing a peptide immunogen according to Claim 18 wherein B is Gly-Gly.

35

125

- 125 -

20. A method for producing a peptide immunogen according to
Claim 19 wherein B is (□-N) Lys.

21. A method of inducing T helper cell response by employing
5 a peptide immunogen of claim 1.

22. A method of inducing T helper cell response by employing
a peptide immunogen of claim 2.

10 23. A method of inducing T helper cell response by employing
a peptide immunogen of claim 3.

24. A method of inducing T helper cell response by employing
a peptide immunogen of claim 4.

15 25. A method of inducing T helper cell response by employing
a peptide immunogen of claim 5. /

26. A method of inducing T helper cell response by employing
20 a peptide immunogen of claim 6. /

27. A method of inducing T helper cell response by employing
a peptide immunogen of claim 7.

25 28. A method of inducing T helper cell response by employing
a peptide immunogen of claim 8.

29. A method of inducing T helper cell response by employing
a peptide immunogen of claim 9.

30 30. A method of inducing T helper cell response by employing
a peptide immunogen of claim 10.

35 31. A method of inducing T helper cell response by employing
a peptide immunogen of claim 11.

- 126 -

32. A method of inducing T helper cell response by employing a peptide immunogen of of claim 12.

5 33. A method of inducing T helper cell response by employing a peptide immunogen of of claim 13.